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BOOK REVIEWS

Gear Cutting Practice, Machines and Tools; J. C. CROCKETT. Machinery Publishing Co. Ltd. £5.60.

High Performance Gear Design; ALEC STOKES. Machinery Publishing Co. Ltd. £4.50.

THESE two books should be read by every gear designer; but the delay in publishing since the manuscript of the first book was complete means that already some of it is dated: and the prices of both will probably relegate them to library shelves. Publishers should discover that "near-print" exists, that profits may be made by using it; and that it greatly reduces the number of type-setting errors.

The books deserve to be reviewed together because they are monographs by two outstanding practitioners in the field of automotive gears: despite its title, Mr. Stokes' book is exclusively concerned with design in this field, while Mr. Crockett's is concerned essentially with manufacturing and checking gears in the medium size range, although much of what he has to say is equally applicable to much larger and smaller gears. Unfortunately too few gear designers seem to recognize that without an exact knowledge of how their designs are going to be made and checked, their design formulae may be only very approximate. Hobbed and shaped gears may have significantly different root profiles, and their error distributions may also be very different. The weakness of Mr. Stokes' book is that despite a complete collection of the formulae used by the author, and much data on successful gears designed by him, very little attention is paid to discussing the fundamental physics underlying his methods. As a result, the reader is left wondering how to start correlating his own experience with that of the author when the two disagree: in your reviewer's experience, the chapter on "Spur Gear Efficiency" is nonsense as it stands. In the light of other published information, the data on dynamic load factors is dubious, and the author appears to be blissfully unaware that the same gear box can be perfectly successful in one car, yet a failure in another, due to different external dynamics of the systems. The work of Professor Niemann and his colleagues in Munich might never have been published.

Mr. Crockett's book is a mine of information on gear cutting, finishing and checking; it is the first "practical" book to make use of the work in this field which has appeared from Cambridge University, but the work of Professor Opitz and his colleagues at Aachen is scarcely noted. Unfortunately the lessons from it are not really driven home, since the problems resulting both from static stiffness and dynamic resonances do not receive systematic treatment, and no typical figures are quoted. Only one manufacturer of hobbing machines has so far had the courage to admit that his machines must not be run so as to give certain gash frequencies; yet resonances are unavoidable. Nevertheless, this book represents a significant step forward in the literature written in English.

D. W. WELBOURN

Design of Machine Tools; OLAF A. JOHNSON. Published by Chilton; U.K. Agents, Bailey Brothers and Swinfen Limited, 1971. £4.25.

THE BOOK is intended mainly for young engineers entering the machine tool industry, but is claimed to be of use to draughtsmen, senior engineers and management as well. Since the

author is a design consultant, and was formerly the senior design engineer of a famous machine tool company, he has much experience to draw on, and this is reflected in the opinions he expresses.

This having being said, however, it must be stressed that the scope of the book is limited, and many important matters are dealt with very briefly indeed. The book has some 260 pages, of which about 160 are occupied by illustrations or tables. Many of the sketches emphasize practical points about which one expects to hear from an experienced designer, but other figurés are either general views of machines, or illustrations of bearings, chains, belts, gears and so on with which the young engineer should already be familiar.

In the remaining space the author deals with steps in design procedure, making a market survey, the preliminary design of a machine, the design and appraisal of the prototype machine, the steps necessary to make it suitable for manufacture and, finally, reports and communications. Throughout, he pays great attention to getting objectives right, seeing that everyone concerned is informed of them and of the solutions produced, and he hints at the dangers which may ensue if these are neglected. The brevity of the sections on topics such as bearings, drives, electrical components, pneumatic and hydraulic systems, and material selection is such that the would-be designer will have to continue his studies elsewhere in greater depth, particularly if he is concerned with complex or advanced types of machine tools. Such calculations as are given are quite elementary and little or nothing is said on the implications of recent research on bearings, structural design or control.

This book could be studied with advantage by many of those for whom it is intended, but its usefulness would have been enhanced by the provision of references for further reading.

I. S. MORTON

The Application of Stepping Motors to Machine Tools; R. BELL, A. C. LOWTH and R. B. SHELLEY. Published by Machinery Publishing Company, 1970. £1.50.

THE BOOK is based on the seminar held at the University of Manchester Institute of Science and Technology in June, 1969, and summarizes the principles involved, the equipment available, and actual or potential applications. It provides a useful introduction for designers considering stepping motor drive systems.

Stepping motors have become well-known during the past decade, particularly through work in Japan, then in Russia and the U.S. and, more recently, in Western Europe. Two principal machine tool applications are envisaged, namely to indexing or similar motions and to N.C. systems. The authors pay particular attention to the latter, for which they feel that this class of drive is technically and economically acceptable in many applications.

After briefly recalling relevant features of feed drive control systems, the authors go on to describe the principles of electric and electrohydraulic stepping motors, and indicate the characteristics and performances which may be expected. Further chapters refer to control systems, and the design of stepping motor feed drives. Brief but informative particulars are given of European and Japanese machine tools using electrohydraulic stepping motors. They conclude by giving a valuable summary of the published characteristics of commercially availabe stepping motors.

I. S. MORTON